CLAIMS

1. A plasma etching reactor comprising a reaction chamber (1) surrounded by a leakproof wall (2), containing substrate support means (3), and communicating with a plasma source (4), is characterized in that it further comprises a heater liner (14) of an appropriate metal or alloy lining all or part of the leakproof wall (2) of the reaction chamber (1) in non-leakproof manner, and an intermediate thermal insulation space (15) provided between the heater liner (14) and the leakproof wall (2) of the reaction chamber (1).

2. A reactor according to claim 1, characterized in that the appropriate metal or alloy is selected from metals and alloys that firstly do not react with the fluorine-containing etching gas or the passivation gas to form volatile compounds, and secondly do not emit contaminating atoms under the effect of plasma bombardment.

3. A reactor according to claim 2, characterized in that the appropriate metal is aluminum or titanium.

4. A reactor according to any one of claims 1 to 3, characterized in that it further comprises:

· bias means (10, 11) for biasing the substrate support means (3) in order to control bombardment by particles coming from the plasma;

· an etching gas source (9a), and means (9b) for controlling the etching flow rate to govern the introduction of etching gas into the plasma source (4);

· a passivation gas source (9c), and means for controlling the passivation flow rate (9d) for governing the introduction of passivation gas into the plasma source (4); and

· a control device (9e) adapted to cause the etching gas flow rate control means (9b) and the passivation gas flow rate control means (9d) to operate in alternation.

5. A reactor according to any one of claims 1 to 4, characterized in that the heater liner (14) is fastened to the leakproof wall (2) of the reaction chamber (1) by a small number of fastening points (16a, 16b).

6. A reactor according to claim 5, characterized in that the intermediate space between the heater liner (14) and the leakproof wall (2) of the reaction chamber (1) communicate with the central space of the reaction chamber (1) via an annular space (14c) of small thickness.

7. A reactor according to claim 5 or claim 6, characterized in that the fastening points (16a, 16b) are of thermally insulating structure opposing the transfer of heat energy by conduction from the heater liner (14) to the leakproof wall (2) of the reaction chamber (1).

8. A reactor according to any one of claims 5 to 7, characterized in that the heater liner (14) is suspended from the leakproof wall (2) of the reaction chamber (1) by three projections having heads, projecting beneath the face of the leakproof wall (2) and engaged in keyhole-shaped slots each having a wide portion and for passing a head and a narrow portion for retaining the head.

9. A reactor according to any one of claims 1 to 8, characterized in that the heater liner (14) is thermally coupled to heater means such as electrical resistances (17) suitable for connection to an external source of electrical energy.

10. A reactor according to claim 9, characterized in that the electrical resistances (17) comprise thin-film electrical resistances and/or electrical resistances of the thermocoaxial type.

11. A reactor according to any one of claims 1 to 8, characterized in that the heater liner (14) is heated by radiant heater means such as infrared elements.

12. A reactor according to any one of claims 1 to 11, characterized in that the heater liner (14) is associated with temperature-regulator means (18-21) for regulating its temperature in a suitable range of temperature values.

13. A reactor according to any one of claims 1 to 12, characterized in that the heater liner (14) includes heater means (17) suitable for heating it to a temperature higher than 150°C.

14. A reactor according to any one of claims 1 to 13, characterized in that the inside surface (14d) of the heater liner (14) is structured so as to present a low radiation emission coefficient.

15. A reactor according to any one of claims 1 to 14, characterized in that downstream from the substrate support means (3) the reaction chamber (1) is limited by a conductive grid (5) in thermal contact with the heater liner (14).

16. A reactor according to any one of claims 1 to 15, characterized in that the substrate support means (3) comprise electrostatic electrodes (3a) for attracting the substrate.

17. A method of etching a substrate (23) by means of a plasma (24) in a reactor according to any one of claims 1 to 16, the method being characterized in that it comprises alternating steps of etching the substrate (23) by a plasma (24) of a fluorine-containing etching gas, and steps of passivating surfaces by a plasma (24) of C_xF_y passivation gas, and in that, at least during the passivation steps, the heater liner (14) is heated to a temperature higher than the condensation temperature of the polymers generated by the plasma (24).

18. A method according to claim 17, characterized in that the heater liner (14) is heated continuously during all of the steps of the method.